

# ARNAB ROY

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## OBJECTIVE

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Seeking a position in industry that will utilize my knowledge in fluid mechanics, thermodynamics and heat transfer for product development, testing or research while contributing to the organization's growth

## SUMMARY

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- 5 years of research experience in high pressure & temperature fuel mixing using laser-based diagnostics
- Extensive experience in thermodynamics, heat transfer, fluid mechanics, data measurement and analysis
- Proficient in using planar laser induced fluorescence (PLIF) diagnostic technique and image processing
- Strong publication record in reputed peer-reviewed journals and several international conferences
- Expertise in MATLAB, LabVIEW, AutoCAD, C, and MS Word, Excel and Powerpoint
- Over 4 years of experience as teaching assistant for undergraduate/graduate courses and labs
- Strong communication skills and ability to work in a diverse, team-oriented, multi-tasking environment

## EDUCATION

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**Ph.D. Aerospace Engineering**, University of Florida, Gainesville, FL *December 2012*  
*Dissertation:* Supercritical Fuel Injection and Mixing in Single and Binary Species Systems  
*Advisor:* Dr. Corin Segal  
*GPA:* 3.97/4.00

**B.S. Mechanical Engineering**, Jadavpur University, Calcutta, India *June 2007*  
*GPA:* 8.29/10.00

## EXPERIENCE

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### Georgia Institute of Technology

*Postdoctoral Fellow, Sustainable Thermal Systems Laboratory* *January 2013 - present*

- Developing microchannel absorption heat pumps for space conditioning and water heating applications
- Writing technical reports for sponsors, managing multiple projects, and assisting junior colleagues
- Mentored undergraduate students to design innovative heat exchangers for nuclear reactor applications

### University of Florida

*Research Assistant, Combustion and Propulsion Laboratory* *August 2007 - December 2012*

- Experimentally investigated high pressure and temperature (supercritical) fuel mixing applicable to diesel engines, gas turbines and rocket engines using laser diagnostics. Project funded by NASA
- Designed test equipment/data acquisition systems using AutoCAD/ LabView. Performed temperature and flow measurements, extensive data analysis, technical report preparation and presentation
- Applied PLIF for optical diagnostics and used MATLAB extensively for image processing to establish the first complete images of the jet core structures and also quantified different flow mixing criteria
- Developed methods to measure jet core length/spray angle and their dependence on injection conditions
- Analyzed stability and drop/droplet size of supercritical fuel sprays using a unique numerical approach
- Formulated calibration model for laser absorption and non-linear fluorescence for high energy lasers
- Calibrated an optical parametric oscillator (OPO) using a spectrometer to emit UV to visible radiation
- Assisted and mentored junior colleagues in building apparatus for high-power heater facility
- Designed optical diagnostics for combustion experiments inside a scramjet facility

## University of Florida

### Teaching Assistant

January 2008 - August 2012

- Assisted teaching of several undergraduate and graduate courses including *Aerospace Propulsion*, *Classical Thermodynamics*, *Data Measurement and Analysis* and *Introduction to Compressible Flow*
- Evaluated homeworks and exams, tutored students and lectured periodically a class of 120 students
- Supervised 30 undergraduate students for *Thermo-Fluids Design and Lab*
- Performed experiments including detailed characterization of pipe losses, performance evaluation of centrifugal compressors, analysis of refrigeration systems and other fluids machinery

## Jadavpur University

### Research Co-Worker

January 2007 - May 2007

- Generated grids for a CFD code for liquid flow over a cylinder using FORTRAN
- Designed components for an internal combustion engine involving preliminary stress analysis

## PEER-REVIEWED JOURNAL PUBLICATIONS

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- **Roy, A.**, Joly, C., Segal, C., “Spreading Angle and Core Length Analysis of Supercritical Jets”, *AIAA Journal*, 2013 (*Being finalized for publication*)
- **Roy, A.**, Joly, C., Segal, C., “Disintegrating Supercritical Jets in a Subcritical Environment”, *Journal of Fluid Mechanics*, Vol. 717, 2013, pp. 193-202
- **Roy, A.**, Segal, C., “Linear Stability Analysis of a Sub-to-Supercritical Jet”, *Physics of Fluids*, Vol. 24 (3), 2012, pp. 0341041-0341048
- **Roy, A.**, Gustavsson, J.P.R., Segal, C., “Spectroscopic Properties of a Perfluorinated Ketone for PLIF Applications”, *Experiments in Fluids*, Vol. 51(5), 2011, pp. 1455-1463
- **Roy, A.**, Segal, C., “An Experimental Study of Fluid Jet Mixing at Supercritical Conditions”, *Journal of Propulsion and Power*, Vol. 26 (6), 2010, pp. 1205-1211

## CONFERENCE PUBLICATIONS AND POSTER PRESENTATIONS

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- **Roy, A.**, Joly, C., Segal, C., “Supercritical Fuel Injection in Multi-Species Systems”, *48th AIAA Joint Propulsion Conference*, 29 July - 1 August 2012, Atlanta, GA, AIAA-2012-4091
- **Roy, A.**, Segal, C., “Supercritical Mixing in Single and Dual Species Systems”, *3rd Annual FCAAP Symposium and Exhibition*, 26-27 April 2012, Tallahassee, FL (*Poster*)
- **Roy, A.**, Segal, C., “Sub-to-Supercritical Mixing in Single and Dual Component Systems”, *50th AIAA Aerospace Sciences Meeting*, 9-12 January 2012, Nashville, TN, AIAA-2012-346
- **Roy, A.**, Segal, C., “Sub-to-Supercritical Mixing and Core Length Analysis of a Single Round Jet”, *49th AIAA Aerospace Sciences Meeting*, 4 - 7 January 2011, Orlando, FL, AIAA-2011-792
- **Roy, A.**, Segal, C., “Subcritical to Supercritical Mixing of a Single Round Jet”, *48th AIAA Aerospace Sciences Meeting*, 4 - 7 January 2010, Orlando, FL, AIAA-2010-1149
- **Roy, A.**, Segal, C., “Experimental Study of Subcritical to Supercritical Jet Mixing”, *47th AIAA Aerospace Sciences Meeting*, 5 - 8 January 2009, Orlando, FL, AIAA-2009-809

## PROFESSIONAL ASSOCIATIONS

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- Member of the *American Institute of Aeronautics and Astronautics* (AIAA) since 2009
- Reviewer for the *International Journal of Hydrogen Energy*
- Trained by *Continuum Lasers* to operate, align and maintain pulsed and tunable laser sources

## SKILLS

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**Technical:** Experimental Fluid Dynamics, Supercritical Fluids, Laser Based Diagnostics, Heat Transfer

**Computer:** MATLAB, LabVIEW, AutoCAD, C, MS Excel, Word, PowerPoint

**Languages:** English (Fluent), Bengali (Native speaker), Hindi (Fluent), Spanish (Beginner)

## GRADUATE COURSEWORK

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**Heat Transfer:** Thermodynamics, Conduction, Convection, Combustion, Gas Turbines and Jet Engines

**Fluid Flow:** Fluid Mechanics I & II, Turbulent Fluid Flow, Compressible Flow I & II, Multiphase Flow

**Special Topics:** Laser Based Diagnostics, Data Measurement and Analysis, Optics, Flow Control and Hydrodynamic Stability

## LEADERSHIP ACTIVITIES

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**Member, Graduate Student Council, University of Florida** *January 2011 - December 2012*

- Conducted mentoring workshops with department colleagues every semester for new graduate students
- Led and organized laboratory tours and other departmental events for students and faculty

**Member, Tae Kwon Do Club, University of Florida** *January 2011 - December 2012*

- Organized training workshops and assisted in teaching classes
- Performed social service activities in and around Gainesville

**Choreographer, Indian Dance Group, University of Florida** *December 2010 - December 2012*

## REFERENCES

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**Dr. Corin Segal:** Professor, University of Florida, *cor@ufl.edu*, Phone: 352-328-6765

**Dr. William Lear:** Associate Professor, University of Florida, *lear@ufl.edu*, Phone: 352-672-2763

**Dr. S. A. Sherif:** Professor, University of Florida, *sasherif@ufl.edu*, Phone: 404-434-5031

**Dr. Ranganathan Narayanan:** Professor, University of Florida, *ranga@ufl.edu*, Phone: 352-392-9103

**Dr. Lou Cattafesta:** Professor, Florida State University, *cattafes@ufl.edu*, Phone: 352-359-4691